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A Reliability Generalization on the Children's Hope Scale

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Abstract The Children's Hope Scale is one of the most commonly used self-report measures of a child's future oriented goal motivation. This study presents a reliability generalization on both the internal consistency and test-retest reliability estimates for the Children's Hope Scale. While 225 published works were analyzed 4.2% authors did not report reliability estimates for their study and 10.7% induced from a previous study. The average internal consistency score (N = 164) was .81 (95% CI = .79 – .82) and the test-retest (N = 15) at .71 (95% CI = .64 – .78) respectively. An analysis of variance showed that non-English language samples produced moderately lower (albeit still acceptable) Cronbach's Alpha estimates. The results of the reliability generalization suggest the score reliabilities produced by the Children's Hope Scale are acceptable across samples. The findings of this study paired with the growing number of validation studies suggest researchers can use of the Children's Hope Scale with increased confidence.

Keywords Children's hope scale · Measurement · Reliability · Reliability generalization

The Children's Hope Scale is one of the most widely used measures of child hope and has been translated for use across several languages and cultures (Snyder et al. 1997). While structural, convergent, and divergent validity studies are emerging for the Children's Hope Scale, no studies exist to aid researchers in considering how reliable

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scores are likely to occur as well as the potential influences sample characteristics when choosing to measure hope. The purpose of the current study was to add to the literature on the Children's Hope Scale by conducting a reliability generalization study (Vacha-Haase 1998) to quantitatively assess score reliability across studies.

1 Hope Theory

Hope has historically been recognized as an important psychological strength buffering the effects stress, adversity, and trauma (Frank 1968; Menninger 1959; Saleebey 2000; Smaldino 1975; Snyder 1994; Valle et al. 2006). Snyder's hope theory, on which the Children's Hope Scale is based, represents one of the more common models involving the cognitive assessment of successfully attaining a future goal (Snyder 1994; Snyder 2000; Snyder 2002; Snyder 2004). In this context, hope is comprised of three issues, goals, pathways, and agency. *Goals* represent the cornerstone of hope theory as the cognitive endpoint to planned behavior (Snyder 2000). Goals exist across life domains, are positioned in the short- or long-term, and are of sufficient value to motivate behavior. Behavior motivated by hope requires the goal to be potentially attainable, yet uncertain. Goal seeking and goal attainment represent a foundation for well-being, for as a person approaches and attains goals, positive affect results (Steca et al. 2016). *Pathways* represent a mental mapping process to identify multiple strategies toward the desired goal. Viable pathways are within the individual's capacity pursue. These pathways are developed from a future orientation imagining potential barriers and workable solutions. Hopeful individuals generate multiple pathways toward their goal pursuits (Snyder 2002). *Agency* represents the goal-directed motivational cognitions for hope theory. Agency represents the capacity to exert mental energy or willpower necessary to consider goals and sustain the pathway pursuits. Hopeful individuals are able to exhibit self-control during their goal pursuits especially while experiencing stress, adversity, or competing cognitive demands (Gailliot and Baumeister 2007; Valle et al. 2006).

1.1 Hopeful Children

Hope is an important psychological strength and has been associated with a variety of important outcomes for children (Barnum et al. 1998; Ciarrochi et al. 2015; Gilman et al. 2006). Hopeful children produce better problem solving skills (Pedrotti et al. 2008), tend to be more optimistic about the future (Snyder et al. 1997), and report adaptive coping strategies and personal adjustment (Chang and DeSimone 2001; Gilman et al. 2006; Hellman and Gwinn 2016; Lewis & Kliewer 1996; Valle et al. 2004). Hope contributes to academic achievement with respect to attendance, grades, graduation rates, and college performance (Marques et al. 2011; Worrell & Hale 2001).

1.2 Children's Hope Scale

The Children's Hope Scale (Snyder et al. 1997) is a six-item self-report dispositional measure of both pathways and agency thinking developed for children between the ages of eight and 16. This scale uses three pathway and three agency statements that can be summed to generate a total hope score. These measures are presented with a six

point Likert-type response format (1 = none of the time to 6 = all of the time) with total scores ranging from six to 36. Higher total scores reflect higher hope among the child participants. In the original development and validation study, Snyder et al. (1997) used five different samples of children from the US. Snyder et al. (1997) reported internal consistency ranges between .74 to .81 with one month test-retest at r = .71. Using principal components analysis, Snyder et al. (1997) reported a two-component solution with acceptable convergent and divergent. Valle et al. (2004) conducted a confirmatory factor analysis supporting a correlated two-factor model representing both the pathways and agency dimensions.

A few studies have translated the Children's Hope Scale to non-English languages with findings demonstrating acceptable psychometric characteristics for Spanish youth (Pulido-Martos et al. 2014), Mexican American youth (Edwards et al. 2007), Portuguese youth (Marques et al. 2009), Indonesian youth (Haroz et al. 2015), South African youth (Savahl et al. 2016), and Native American youth (Shadlow et al. 2015). While the Children's Hope Scale has been used extensively and its two factor conceptualization empirically supported, no study to date has conducted a meta-analytic investigation on the reliability scores to estimates its central tendency or variability associated with sample characteristics.

1.3 Reliability Generalization

Similar to the meta-analytic perspective for validity estimate, Vacha-Haase (1998) introduced reliability generalization as a technique to quantitatively assess score reliability across studies. Reliability generalization synthesizes data from many sources providing the central tendency and variability of reliability estimates, and evaluates the study characteristics that tend to produce higher or lower reliability scores (Vacha-Haase 1998). To conduct a reliability generalization study, primary studies using a specific measure are obtained by the researcher and sorted based upon the type of reliability statistic computed, noting those studies that have induced or failed to report score reliability. Articles are further coded for specific sample and study characteristics (i.e., average age, number of items used, etc.) with specific attention to those characteristics that are believed to contribute to the variability in the reliability estimates. More specifically, sample characteristics can be tabulated as a way to account for variability in reliability estimates when used as the dependent variable (Yin & Fan 2000).

Score Reliability Reliability describes the consistency of scores obtained from a measure rather than an indicator of the measures quality. Indeed, tests are neither reliable nor unreliable (Croker & Algina 1986; Gullicksen 1950; Thompson 2003). Samples, sampling procedures, and testing situations, among other unique study characteristics, influence measurement error such that inducing reliability from previous empirical results is considered problematic. Further, scores obtained from samples using a particular scale, with a given number of items, under different circumstances contribute to reliability estimates. These systematic sources of measurement error reduce effect size estimates (thereby reducing statistical power) potentially increasing type II error rates (Henson 2001; Lord & Novick 1968; Pedhauzer 1997). However, when an instrument produces consistently high reliability estimates, as identified by

reliability generalization studies, one can have greater confidence that the scale is consistently capturing a variable with limited measurement error.

1.4 Purpose of Study

The following research questions, guided the reliability generalization study: (1) How reliable are scores obtained using the Children's Hope Scale?; and (2). Do sample characteristics (e.g., age, gender, minority status) correlate with reliability estimates from the Children's Hope Scale? The answer to these research questions will provide researchers with an important foundation when choosing to measure child hope. The answer to the first question will provide researchers with an estimation of expected reliability when designing studies to measure hope among children. The second question will provide researchers with a better understanding about potential biases when using the Children's Hope Scale. For instance, a significant correlation between age and reliability estimates will suggest that the scores contain more or less error given the age of children assessed. While researchers should report the score reliability for their sample, the results of a reliability generalization study should inform researchers when choosing a measure.

2 Method

2.1 Sample of Articles

An initial literature search was conducted using PsycARTICLES, PsycINFO, and Google Scholar databases searching for articles that have cited the Children's Hope Scale (Snyder et al. 1997). This resulted in a total of 299 articles that could be obtained and examined for score reliability. An examination of these articles identified that 66 articles did not use the scale. Of the remaining 225 empirical studies, 4.2% did not report a reliability score and 10.7% were found that induced reliability from another study. Cronbach's alpha coefficients were reported in 164 studies and test-retest scores were reported in 15 studies. Sample characteristics and study features that were coded included, scale mean, scale standard deviation, sample size, average age, percent male, percent Caucasian, and language in which the scale was presented.

3 Results

While hope scores are comprised of both agency and pathway items, all published reliability estimates evaluated in this study were based upon a total scale score of the Children's Hope Scale. Consequently, internal consistency scores ($N = 164$) from the total scale score of the Children's Hope Scale in addition to temporal stability scores ($N = 15$) of the total scale score were examined in this study.

Internal Consistency Reliability Computing the internal consistency of a measure allows one to estimate how consistently respondents performed across the six items

within the Child Hope Scale. One-hundred and sixty-four studies were found that reported the internal consistency reliability (Cronbach's Alpha) scores for their study. Scores ranged from a low of .54 to a high of .95. The mean reliability estimate was .81 (*SD* = .07; *SE* = .01) with a 95% confidence interval ranging from .80 to .82. The median and mode reliability coefficient were .82. Moreover, the distribution was slightly skewed negatively (−0.71; *SE* = .19) with a kurtosis of 0.40 (*SE* = .38).

Test-Retest Reliability Test-retest reliability is an estimate of the temporal stability that is important when researchers are attempting to build an argument for psychological traits such as the Children's Hope Scale. Fifteen studies were found that reported the test-retest reliability scores from a low of .45 to a high of .95. The mean reliability estimate was .71 (*SD* = .12; *SE* = .03) with a 95% confidence interval ranging from .64 to .78. The median and mode reliability coefficient were .72 and .73 respectively. Moreover, the distribution was slightly skewed negatively, (−0.21; *SE* = .58) with a kurtosis of 1.19 (*SE* = 1.12).

3.1 Correlation Analysis

Table 1 below presents the zero-order correlations between the sample characteristics and the internal consistency reliability score estimate. As seen in the table, the score mean had a statistically significant and positive correlation with score reliability. Samples with higher average hope scores were more likely to produce higher Cronbach's Alpha scores. Additionally, language showed a statistically significant and negative association with score reliability. Indeed, non-English language scales tend to be associated with lower score reliability. Subsequently, a one-way Analysis of Variance was computed to further explore this finding. As suspected, English language studies (*N* = 96; M = .82; SD = .07; CI = .81–.84) produced higher Cronbach's Alpha scores compared to the non-English studies (*N* = 53; M = .78; SD = .08; CI = .76–.80). Additionally, these differences were statistically significant [F (1147) = 12.16; $p < .01$] with differences being of moderate size (Cohen's D = 0.57). No meaningful correlations were found between score reliability estimates and the sample characteristics of age, gender, or minority status suggest limited potential for bias in responding for the Children's Hope Scale. Given the limited number of studies available for analyses test-

Table 1 Zero-order correlation matrix of children's hope scale internal consistency reliability scores and coded study characteristics

	M	SD	1	2	3	4	5	6	7	
1. Score Reliability	.81	.07	--							
2. Scale Mean	25.64	4.92	.32*	--						
3. Scale SD	5.25	1.50	.10	.51*	--					
4. Sample Size	357.06	402.20	.06	−.30*	−.03	--				
5. Average Age	13.51	4.50	−.17	−.31*	−.13	.06	--			
6. % Male	47.56	11.69	.10	.05	−.11	.07	−.37*	--		
7. % Caucasian	26.29	32.83	.15	.06	−.22	.06	−.09	.12	--	
8. Language	1.36	0.48	−.28*	.25	.29*	.04	−.08	.01	−.53*.	--

N = 164. Language: 0 = English, 1 = Non-English. * $p < .05$

retest reliability was not included in the correlation analyses. Additionally, no significant differences were observed between English and non-English studies with regards to test-retest.

4 Discussion

The purpose of the present study was to employ reliability generalization on the Children's Hope Scale (Snyder et al. 1997). This study was guided by two questions: how reliable are scores using the Children's Hope Scale; and, do sample characteristics correlate with these reliability estimates? The mean reliability estimate for internal consistency was in the acceptable range for both survey development and experimental applications but potentially at the lower end for clinical studies (Howell and Shields 2008). Correlational analysis suggests that internal consistency scores are relatively independent from sample characteristics for age, gender, and minority status of the sample. However, the ANOVA results demonstrated that non-English language studies tend to produce moderately lower internal consistency. Albeit lower, the non-English language studies also produced acceptable levels of internal consistency estimates.

Another potentially important finding from the current study is the high level of test-retest reliability estimates across the studies. In this case, no statistically significant differences were observed when comparing English and non-English language studies. The average test-retest reliability estimates found in this study suggest Children's Hope Scale is a good dispositional measure. Our reliability generalization findings combined with the validation studies suggest the Children's Hope Scale is a reasonable measure of both pathways and agency toward a future oriented goal in English and non-English speaking samples.

4.1 Limitations of Study

As with any reliability generalization, this study is limited in the number of published studies that have empirically used the Children's Hope Scale and reported reliability estimates for their study. While less than 5 % of the studies did not report reliability estimates, over 10% induced which is problematic when readers are attempting to contextualize findings (Wilkinson and the APA Task Force on Statistical Inference 1999). While examining the effects of language is an important finding for researchers, there was not enough non-English language studies to further isolate the source of difference. Despite these potential limitations, this study has demonstrated the ability of the Children's Hope Scale to generate reliable estimates for Cronbach's Alpha and test-retest.

5 Conclusion

In sum, hope has emerged as an important psychological strength for children and an important indicator of child well-being (Ben-Arieh 2008; Bernardo 2015). A growing number of studies are showing important relationships between hope and a child's psychological adjustment, health outcomes, academic performance, and subjective

well-being (cf. You, Furlong et al. 2008). Researchers interested in understanding individual differences, clinical efficacy, and adaptive outcomes in child hope require measurement tools with strong psychometric properties. Measurement efficacy will be especially true for understanding hope in cross-cultural comparisons. Based upon the theoretical operationalization, the existing validation studies, and our findings, researchers can use the Children's Hope Scale (Snyder et al. 1997) with increased confidence.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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